EXHIBIT D

Professional Analysis and Consulting, Inc.
4951 Indiana Avenue, Suite 600
Lisle, IL 60532

Project No. 2018

THOMAS R. AHERN

v.

SIG SAUER, INC. AND CITY OF CAMBRIDGE

Report Prepared for:

Jeffrey S. Bagnell, Esq.
Bagnell Law, LLC
55 Post Road West
Westport, CT 06880

Peter K. Levitt, Esq.
Pietro A. Conte, Esq.
Donnelly Conroy & Gelhaar, LLP
260 Franklin Street, # 1600
Boston, MA 02110

Report Prepared by:

Timothy M. Hicks, P.E.

Date of Report: November 29, 2023

Confidential – Attorney's Eyes Only

Introduction

On May 19, 2019, City of Cambridge Police Department (CPD) Detective Lieutenant Thomas R. Ahern (Lt. Ahern) and six other officers were inside a SWAT vehicle preparing for crowd control for the annual Mayfair near Harvard Square. Lt. Ahern was performing a routine function check of his Safariland Level 3 Retention Holster. The final attempt failed to secure the weapon, so he removed the firearm and was holding it in a safe and low position, with his right index finger along the slide, when his CPD issued Sig Sauer P320 discharged without a trigger pull. The bullet struck Lt. Ahern's left thigh over his duty pants and deflected off a magnet on his cell phone that was inside his left pant pocket. After it ricocheted off his cell phone, it penetrated an equipment bag that was on the floor in the van before coming to rest in a ballistic helmet. Lt. Ahern was not seriously injured in this incident, nor were any of his fellow officers.

Professional Analysis and Consulting, Inc. was retained to perform an independent investigation into this incident and to provide a report of our findings.

Professional Qualifications

Professional Analysis and Consulting, Inc. (Professional Analysis) is a technical consulting firm specializing in product performance and root cause failure analysis and prevention. The Curriculum Vitae (C.V.), testimony list, and fee schedule of the author are appended as Attachment A.

Timothy M. Hicks, P.E. is a Principal Engineer and has a diverse background in mechanical design and system evaluations, including accident reconstruction. He spent close to 20 years in various roles in the automotive industry, responsible for the design, manufacturing, testing, and validation of vehicle systems. He also has experience in leadership roles for commercial vehicle suppliers and manufacturers, including leading advanced engineering teams. This experience includes conformance to governmental regulations, equipment safety, maintenance and service requirements, and field performance investigations. As part of his consulting experience, in addition to a wide variety of accident investigations, and product failures, he has performed numerous investigations and certification tests on firearms and firearm safety devices, pursuant to California and Massachusetts regulations, and for incidents involving firearms. For the investigation described in this report his investigation methods are in accordance with the generally accepted standards and practices of his field, including utilizing the scientific method.

Mr. Hicks is a Professional Engineer licensed by examination in the State of Illinois, and by comity in other states. The various states require a license for engineers offering services to the public because they recognize that engineering affects safety. The code of ethics for engineers holds public safety paramount.

He is an active member of the Society of Automotive Engineers (SAE) and has been elected as Chair of the Chicago Section in 2018 and has been reelected each year since. The Chicago Section numbers over 1,000 members. He is also a member of the American Society of Mechanical Engineers (ASME), and the National Society of Professional Engineers (NSPE). He also holds Certificates of Eligibility from the California DOJ Bureau of Firearms and Massachusetts Firearms Records Bureau Executive Office of Public Safety for analyzing and performing firearm certification testing. He is also a Sig Sauer certified P320 armorer.

Materials Reviewed and Inspection Conducted

Attachment B, along with the footnotes and references herein, outline the materials reviewed by Professional Analysis with respect to this matter. This list includes materials compiled through Professional Analysis' own research. Several other similar incidents of un-commanded discharges have been captured on video and were also reviewed. These include a SEPTA police officer, a Roscommon, Michigan sheriff, a Honesdale, Pennsylvania officer, an ICE agent in St. Rose, Louisiana, a Milwaukee Police Department officer, and an ICE agent in St. Clair, Michigan. None of these incidents occurred with the law enforcement officer's hand/finger on or near the trigger.

On October 13, 2022, there was an inspection of the subject P320 pistol which included full 3D CT scans, photographs, and measurements. The inspection included the subject firearm, magazine, spent casing, and 17 live rounds. Mr. Peter D. Villani, a Sig Sauer certified armorer in P320, also attended this inspection and assisted with disassembly. It is not known if inspections took place after the incident and prior to the inspection on October 13, 2022. Two City of Cambridge police officers produced the subject firearm and were present during the inspection. It should be noted that additional measurements could be obtained with additional access to the subject firearm, which has not been approved. This would confirm the measurements obtained from the CT scan, similar to the investigations in other cases the author has been retained as an expert. However, the work performed to date is sufficient to support the opinions made.

After the CT scans, the firearm underwent basic functionality testing which was performed by a Sig Sauer consultant under controlled laboratory conditions, and cycled five times according to previous protocols. These included items such as magazine catch, slide catch, magazine release, trigger function, disconnect function, and firing pin function. The firearm was also cycled 101 times while holding it, then pushing and pulling the slide assembly against the grip module, seemingly to simulate holster loading. After these basic functional tests, the trigger pull force was measured and found to range between 6.0 and 6.25 pounds for three of the tests, and between 6.25 and 6.5 pounds for the two others.

Finally, the firearm was disassembled for further analysis by the Sig Sauer consultant, pursuant to the previously agreed to protocol. This allowed for detailed photographs and measurements to be taken of the various components which included the firing control unit, trigger mechanism, and striker assembly. The striker assembly was disassembled by the other plaintiff's expert, Mr. Villani. The subject P320 was identified as having Serial No. 58C278540, an upgraded version of the full-sized carry P320 chambered in 9 mm. The subject firearm was found relatively clean, and was otherwise in an as-manufactured condition, except for normal and anticipated wear. The maintenance history of the CPD subject firearm is not known.

Functional tests representative of expected and reasonable usage and loading conditions, such as vibration, impulse, impact, and other inertial forces while the firearm is holstered and used, and drop testing, were not performed due to over a hundred other similar incidents in the field, many of which were captured on video. These tests, if they could be developed, were also not performed due to not being reasonable or practical and would potentially cause spoliation of the subject firearm. Sig Sauer has testified in another matter that their engineers do not know how to develop an endurance test that would be representative of holstered usage.[1]

[1] Frankenberry vs Sig Sauer, Sean Toner deposition

Background

On May 19, 2019, CPD Detective Lieutenant Thomas R. Ahern (Lt. Ahern) and six other officers were inside a SWAT vehicle preparing for crowd control for the annual Mayfair near Harvard Square. While Lt. Ahern was performing a routine function check of his Safariland Level 3 Retention Holster, his CPD issued P320 discharged without a trigger pull.[2] At the time of said un-commanded discharge, Lt. Ahern was holding the P320 in the traditional "Sul Position" with his right index finger along the frame of the weapon. The Sul position name is taken from the Portuguese language which means "south" since that's where the muzzle is directed, as shown in Figure 1. This position is used to safely control the muzzle position and have the firearm available in a "ready" state.[3]

Figure 1 - Sul position example

The bullet struck Lt. Ahern's left thigh over his duty pants and deflected off a magnet on his cell phone that was inside his left pant pocket. After it ricocheted off his cell phone, it penetrated an equipment bag that was on the floor in the van before coming to rest in a ballistic helmet. The spent casing did not eject and was found still in the chamber, an indication of a malfunction. For reference, two other CPD officers also reported instances where the empty casing failed to eject after experiencing un-commanded discharges with their P320 firearms. It should be noted that the Sig Sauer Tactical Armorer's Manual for the P320 identifies that for the full-sized version that the recoil spring should be replaced after 10,000 rounds are sent through the weapon.[4] It is unlikely that Lt. Ahern's subject P320 had that amount of use and should not have had a need for a recoil spring replacement. As stated, no maintenance records have been produced from the CPD.

On May 15, 2019, four days prior to the day of the incident, Lt. Ahern was involved in gun powder residue testing for another matter. This involved firing the subject P320 into a bullet trap and then having his hands swabbed. After the first test firing, another officer went to fire another round from the subject P320, and found a dead trigger. The dead trigger was caused by the empty casing not ejecting from the previous shot.[5] Additionally, in

[2] Lt. Thomas Ahern deposition Vol II, dated June 27, 2023, page 258
[3] Lt. Thomas Ahern deposition, dated June 8, 2023, pages 73, 80 – 81, 130 - 135
[4] Sig Sauer Technical Armorer's Manual, Sig P320 Pistols, February, 2022 – received during a Sig Sauer Academy P320 Armorer's certification class in October, 2022
[5] Lt. Thomas Ahern deposition, dated June 8, 2023, pages 61 - 63

between the gun powder residue testing and the day of the incident, Lt. Ahern reported that he dropped his subject P320, while in a holster. No issues were identified, and he proceeded to secure his firearm in a safe until the day of the incident.[6]

Lt. Ahern was a twenty-nine-year law enforcement veteran with vast firearms experience. Until resigning in April 2021, Lt. Ahern was the Commanding Officer of the CPD's Special Response Team and the Regional Vice President of the Training and Evaluation Committee, United States Department of Homeland Security's Urban Areas Security Initiative. Lt. Ahern was a CPD firearms instructor and supervised yearly in-service CPD training. He is certified by the Commonwealth of Massachusetts Municipal Police Training Committee as a Firearms Academy Lead Instructor. He was a certified firearms armorer for the P320, the Remington 870 shotgun, and the Remington 700 sniper rifle. Lt. Ahern has received numerous awards and commendations from the CPD and has never received any disciplinary action.

The P320 was Sig Sauer's first striker fired pistol design, introduced in 2014, and was based on the P250 frame, barrel, and magazine. In 2017, Sig Sauer was awarded a large military contract to supply two different versions of the P320 (M17 as a full size and M18 as a compact version), but the military required a redesign due to failures during testing and the need to include a manual safety in all the weapons.[7] No external safety was present on the subject firearm, and the Sig Sauer P320 and P365 are two of very few striker fired pistols on the market without an external safety. Over 100 other reported incidents of similar discharges without the user pulling the trigger have been reported across the United States. Sig Sauer was made aware of approximately 20 other un-commanded discharges prior to Lt. Ahern's incident.[8] Many of these cases have involved different law enforcement agencies, some of which have prohibited the further use of the P320 model by their officers, and replaced it with another brand.

In 2017, Sig Sauer initiated a voluntary upgrade program, instead of a recall, to change the trigger mechanism, along with changes to the safety lever and sear, based on the redesign for the military, without the external safety. Firearms produced after the date of the voluntary upgrade would have the design changes included, but anyone who had purchased a P320 before the upgrade would have to send the firearm back to Sig Sauer for the repair. The subject P320 firearm involved in this incident was the Sig Sauer upgraded version and was otherwise in as-manufactured condition, except for normal and anticipated wear.

In 2020, the United States Patent and Trademark Office (USPTO) awarded Sig Sauer a patent.[9] This patent was for a sear design containing multiple engagement surfaces, which appears to be what became part of the 2017 voluntary upgrade program. In several places within the patent, Sig describes the forces acting upon the firearm, causing the striker to become disengaged from the sear. The following references are made in different parts of the patent, all describing the striker becoming released from the sear, without a trigger pull:

- The initial patent abstract states, *"….to arrest forward movement of the striker in the <u>event of an impulse</u> that causes the striker to disengage…."*.

[6] Lt. Thomas Ahern deposition, dated June 8, 2023, pages 174 -175, 256
[7] During this same timeframe, Ohama Outdoors posted a video documenting drop fire issues with the P320 (https://www.omahaoutdoors.com/blog/sig-sauer-p320-fails-drop-test/)
[8] Christopher Meyer deposition dated November 15, 2023
[9] USPTO Patent No. US 10,684,087 B2, dated June 16, 2020 – Handgun Sear with Multiple Engagement Surfaces

- Patent summary states, *"…to halt the forward movement of the striker when the striker is unintentionally released from the first engagement surface, such as due to an impulse."*
- Detailed patent description section states, *"An unintended striker release can result, for example, from mishandling the firearm, sudden impact, an impulse, or some other event."*
- Description continues, *"…an impulse or other event that disengages the striker catch from the sear…."*
- And, *"…an impulse or sudden impact force can potentially pivot the sear downward and release the striker catch from the sear's first engagement…."*.
- Structure and Operation section states, *"In another example, the impulse is strong enough for sear to displace fully to the downward stop and "bounce" off the downward stop…."*.
- And, *"An impulse or sudden force to the handgun can occur, for example, due to an explosion impact with a flying object, a sudden stop, or other event causing inertial forces on the sear, striker, or other components to release the striker…."*.

Figure 2 - Subject Sig Sauer P320

Findings and Analysis

Examination of CPD Lt. Ahern's pistol found several manufacturing defects, consistent with several previous P320 firearms inspected, which fired un-commanded (no trigger pull by the user) under similar circumstances. These defects explain and support Lt. Ahern's report of an un-commanded discharge of the firearm. The following items were identified:

1. The sear and striker pin components, the engagement of which is a critical feature of this design, are produced using a Metal Injection Molding (MIM) process and do not have any secondary machining performed on the small engagement surfaces. These MIM-produced components have areas of excessive variability due to the manufacturing process. For surfaces where tight tolerances and consistent fit-up are required, MIM parts will typically have secondary processing, or machining, to eliminate the variation. See Figures 3 – 4.

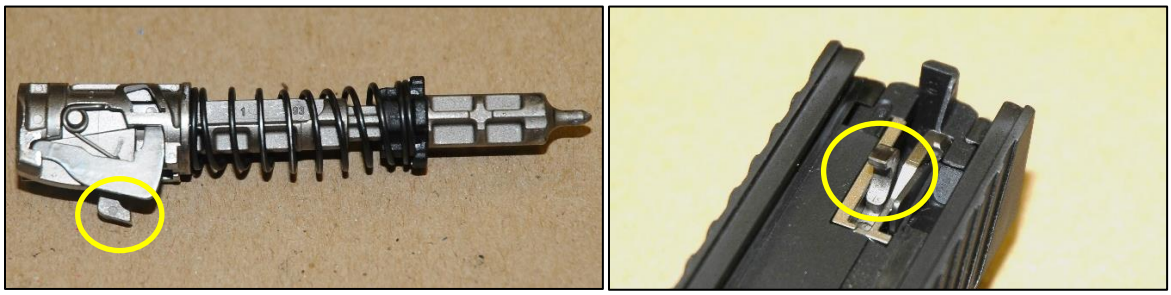

Figure 3 - Striker assembly with striker foot circled (left), striker assembly in the slide assembly (right)

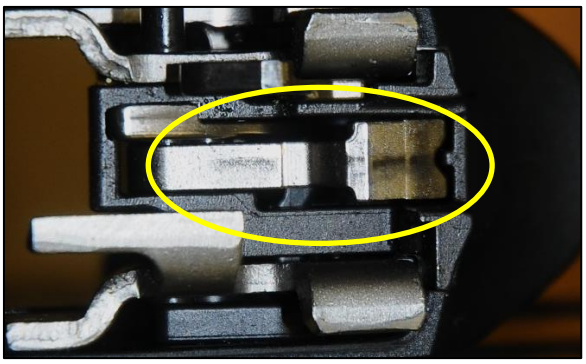

Figure 4 - Top view of sear (circled) and off-center striker drag marks

2. The sear and striker foot portion of the striker pin both exhibited inconsistencies on the surfaces that are in contact with each other, minimizing the actual contact surface area that is needed to keep the parts engaged until the trigger is pulled. In addition to the MIM as-manufactured surfaces (rough and unmachined), both parts also exhibited a raised area around the periphery of the interface surface. This has been referred to by others as rollover and appears to be a combination of flashing, radiused corners and edges, and shrinkage of the inner surface area. The end result is reduced contact surface area between both components, making the firearm more susceptible to an un-commanded discharge. Figure 5 (left) is a close-up photograph of the sear step with clear wear marks from the striker foot that shows an inconsistent pattern, including an area within the step with no wear. Figure 5 (right) is a close-up

photograph of the subject striker foot showing the raised area around the periphery of the face, radiused edges, and an unmachined surface.

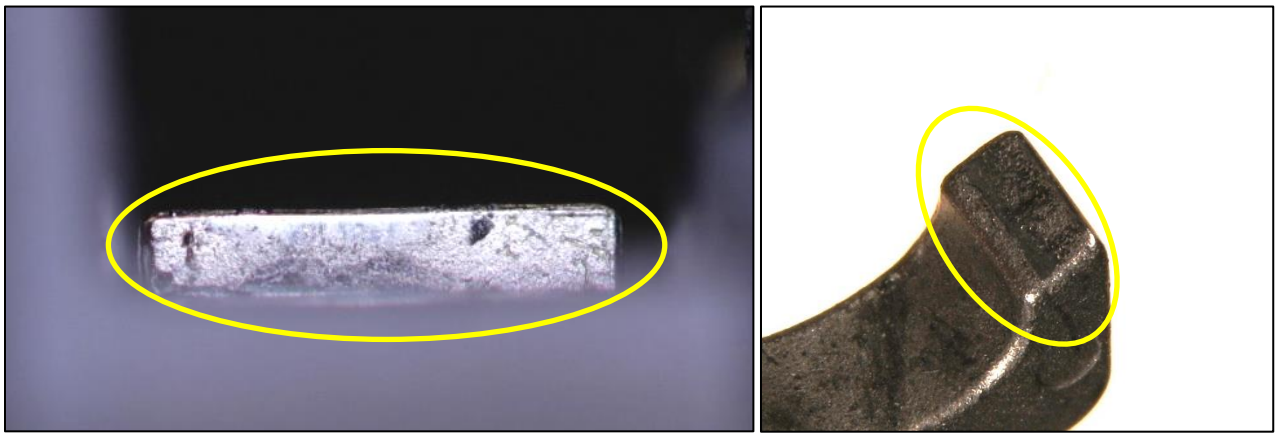

Figure 5 - Close ups of sear step (left), and striker foot (right), both unmachined surfaces

3. In comparison, the photographs in Figure 6 show the machined (or some other secondary processing after molding) surface of the striker foot and sear from other manufacturers' firearms. The photo on the bottom left is from the writer's Springfield Armory XDs striker fired firearm, which has both a tabbed trigger safety and grip safety. As mentioned, the CT scan is unable to be utilized in quantifying or measuring the inconsistencies of the surfaces of the striker foot or the sear step due to its limited resolution. Feature size and dimensions, including radiused corners, can be measured from a CT scan, described more below.

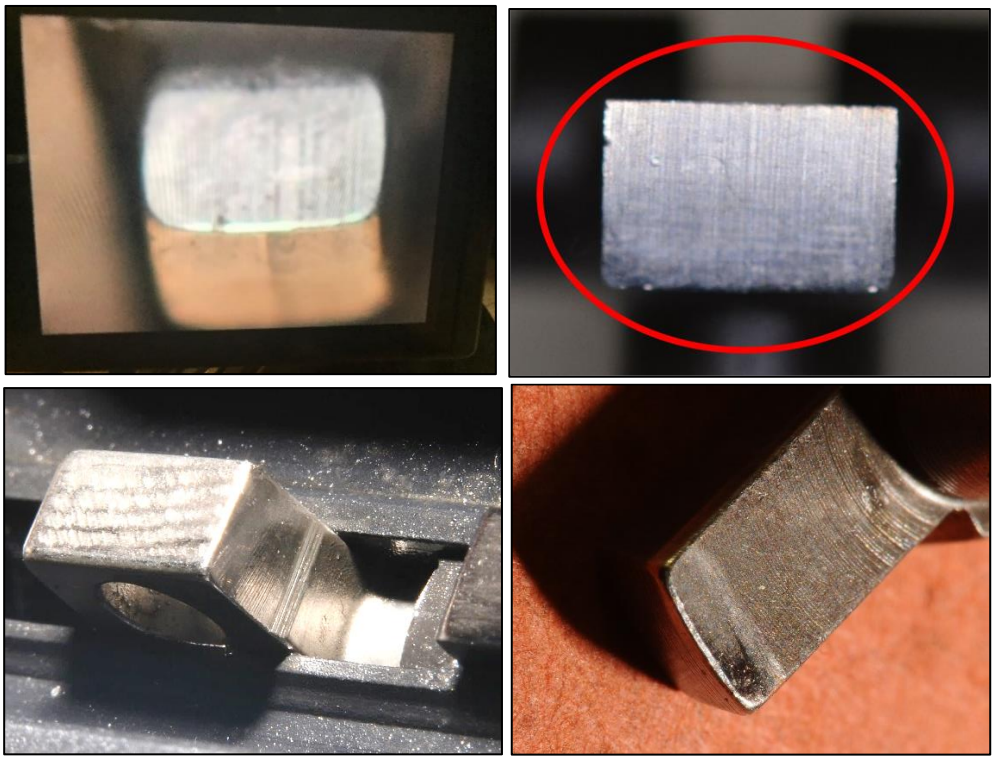

Figure 6 - Other firearms - striker foot (top left), sear face (top right), striker foot (lower left), and striker foot (lower right) all with machined flat surfaces

Additionally, the Sig Sauer Quality Control Document[10] specifies that the trigger bar needs to be *"polished with no burrs"* but does not specify the same requirement for the sear or the striker pin. Sig Sauer recognizes the need to perform secondary processing on some parts of the P320 but chose not to do so on the sear or the striker pin. See Figure 7.

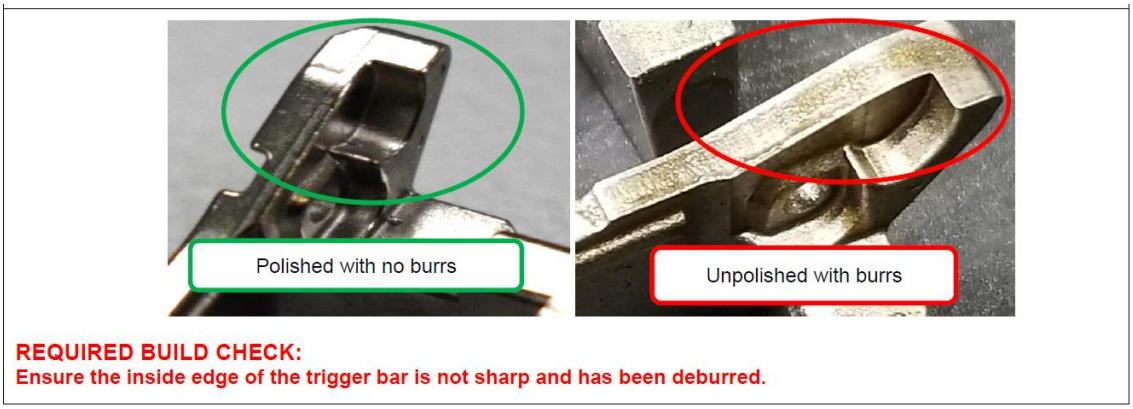

Figure 7 - Image from Sig Sauer P320 Assembly and Quality Inspection Master

[10] Bates SIG-QC 000060 – Sig Sauer P320 Assembly and Quality Inspection Master, rev. 23.

4. The CT scan was also used to document the striker and sear engagement areas as compared to the drawings, shown in Figure 8.[11] The sear step had the top surface, where the striker foot is released from, measured radius at 0.004" (0.11 mm), with the Sig Sauer drawing #1302192[12] indicating a radius of 0.1 mm. The surface profile where the striker engages indicates a tolerance of 0.2 mm, but as with the other components discussed in this report, this dimension could not be quantified with the CT scan. The CT scan of the bottom edge of the striker foot radius measured 0.007" (0.174 mm). The Sig Sauer striker drawing #1302193[13] indicates that the radius on the bottom edge of the striker foot at 0.003" (0.1 mm). This drawing also indicates that the surface that engages with the sear step has a surface finish specification of 0.8, but this could not be quantified with the CT scan.

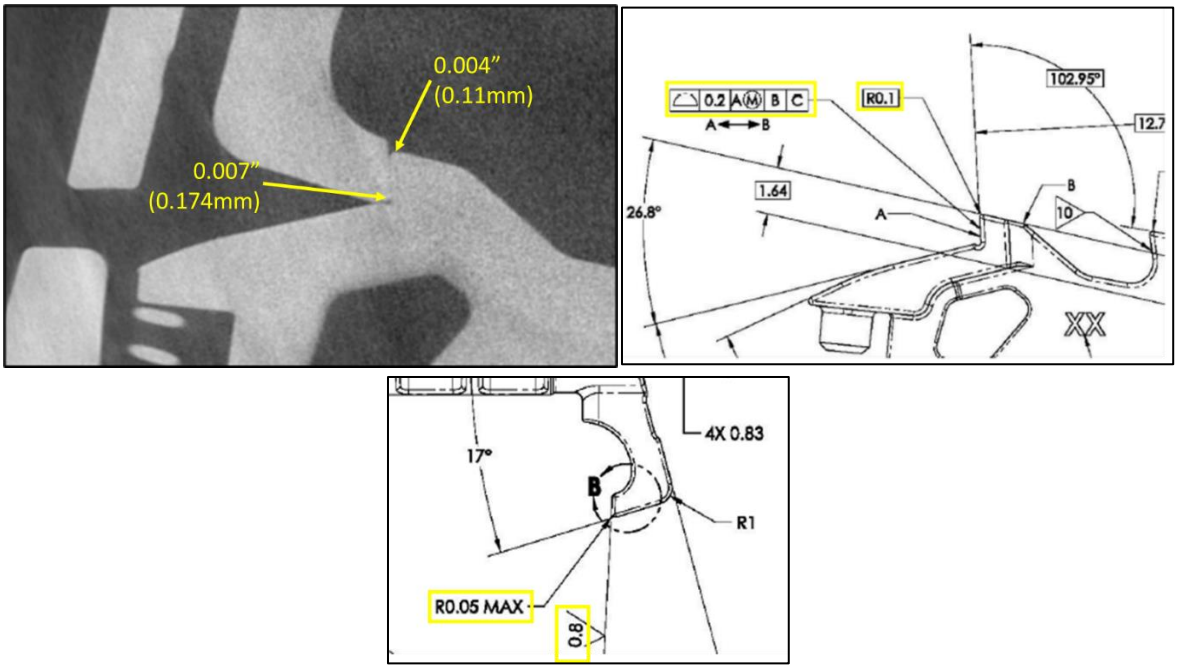

Figure 8 - CT scan of the subject striker and sear (top left), sear drawing (top right), and striker drawing (bottom)

5. In addition to the lack of secondary processing on the sear and striker foot, there is also a vertical misalignment of the two parts, as shown in the CT scan in Figure 9. The striker foot is unable to fully engage with the sear face surface, reducing the area available for the engagement of the two parts. With the minimal amount of overlap and engagement between the two components, a minor amount of vibration, shock, impulse, or relative movement between the slide and the grip module would allow the striker to no longer be retained by the sear, and to move forward and discharge a round. In other words, the ongoing relative movement between the slide and the grip module, in addition to the inertia, impulses, and vibration experienced while secured in a Sig Sauer authorized holster over time, will allow the striker foot to become disconnected from the sear face, in combination with the other defects identified in this report. For reference, the contact surface area measured 0.032" (0.804 mm). No documentation has been produced by Sig Sauer that identified what the design specification is for the

[11] For ease of reading this report the measurement values are placed on the CT images using MS Office tools. The actual CT scan measurements corresponding to the images in this report taken using the efX software are saved in work product
[12] Bates SIG-DRAWINGS_00000148
[13] Bates SIG-DRAWINGS_00000158

contact surface area between the striker foot and the sear. An additional 0.010" (0.266 mm) is available on the striker foot for engagement with the sear, if the sear step was larger, and both striker and sear were machined to eliminate the radiused edges.

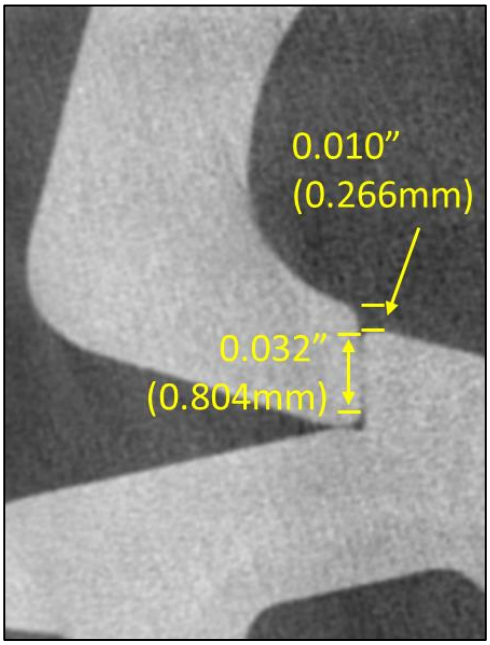

Figure 9 - Subject striker foot to sear contact surface and vertical offset

6. As shown in the CT scan below, there is also a lateral offset between the sear and the striker, causing an unbalanced force and off-center contact on the sear. This off-center contact between the two components allows the sear to be loaded laterally, causing the striker foot to make more contact on one side versus the other. When the sear is consistently loaded in one direction due to the misalignment, it contributes to reducing the actual contact surface area between the striker foot and the step in the sear. The CT scan of this offset is shown in Figure 10. Figures 4 and 5 above show the off-center and inconsistent contact area from the striker foot on the sear step.

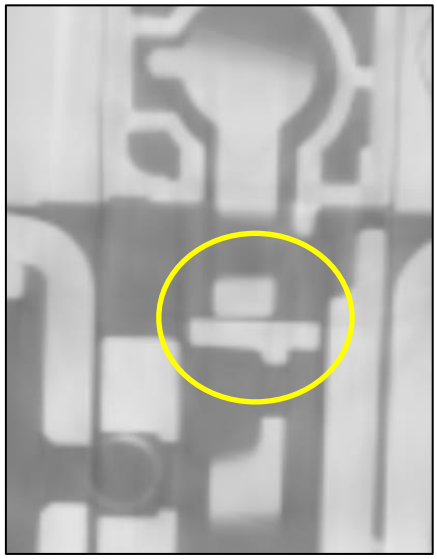

Figure 10 – CT scan slice of striker foot offset to sear

7. In looking at the rear-view CT scan slices of the striker pin relative to the housing, there are gaps within the striker housing, as shown in Figure 11 (left within yellow circle). This allows for axial rotation and movement of the striker pin within the housing each time the firearm is discharged and the slide cycles. This movement will also cause the safety lock tab that is intended to make contact with the parallel horizontal plane of the striker (striker channel) to become out of alignment, and not parallel, creating a gap. Based on the component drawings supplied by Sig Sauer, the maximum allowable angle of the striker pin to the housing is nearly 4˚, however, Sig Sauer had not produced any assembly drawings that document the specification of the complete striker assembly. The misalignment and rotation will cause minimal contact between the safety lock tab and the rear vertical stop portion of the striker, thereby reducing the contact area between the two surfaces. The misalignment could allow the striker pin to continue its forward movement when the striker foot is no longer retained by the sear, in combination with the other defects identified in this report, leading to an un-commanded discharge. The misalignment of the safety lock tab to the striker pin is also shown in Figure 11 (right).

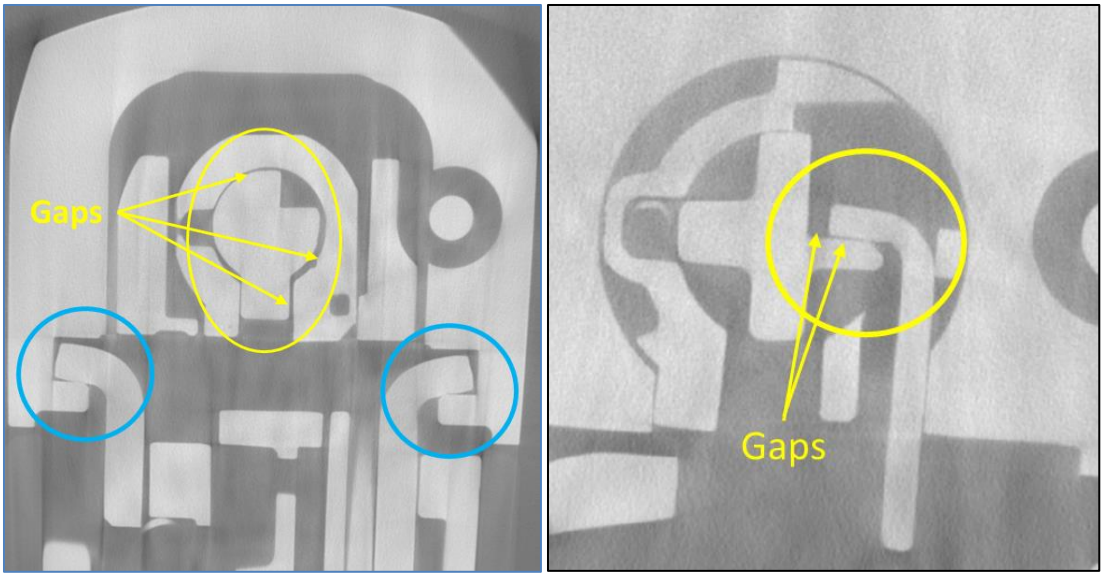

Figure 11 - CT scan view from the rear of striker gaps to housing (left) and safety lock tab misalignment to striker pin (right)

8. The CT images from Figure 11 (left) above also illustrate the slide assembly gaps to the grip module (circled in blue). These gaps allow the striker foot (as part of the slide assembly) to move vertically and laterally relative to the sear (in grip module), such as that experienced while the firearm is carried in a holster, and with vibration, impulses, and other inertial forces. The frame receiver stamping is not made to specification which contributes to the variation and fitment issues between the slide assembly and the grip module. The horizontal tabs were measured at 103.5˚ and 108.4˚ from the vertical wall, when the drawing specification indicates 90˚. Also, the overall width between the slide tabs measured 21.67 mm, smaller than the 21.71 mm minimum tolerance shown on the drawing. It has been stated in previous reports for Sig Sauer that the width of the receiver stamping tabs is machined to tolerance, but no drawings have been produced that verify this information, and no evidence exists on the subject stamping.

   The CT scan is shown below (left) with the frame receiver stamping drawing image (right) in Figure 12. The bottom surface of the receiver tabs are shown as datum "Z" on the Sig Sauer drawing 1301552[14] and all four tabs have a GD&T[15] callout specifying flatness as 0.1 mm. Since none of the four tabs on the frame receiver stamping are perpendicular or flat relative to datum "Z", the frame receiver component does not meet the drawing specification. The bottom surface of the tabs also shows an inconsistent surface due to the forming process, providing for additional variation between the slide and grip module.

   Additionally, the slots machined in the slide where the four frame receiver tabs are retained measured 0.089" (2.28 mm). The slide rail slots measured 2.27 mm and 2.26 mm with a digital caliper. However, as the slide slot dimensions or tolerances are not identified on any of the slide machining drawings produced, this measurement taken could not be compared with the specification. If these slots were also out of specification (too large), then this would also contribute to the amount of variation and play (sloppiness)

[14] Bates SIG-DRAWINGS_00000118.
[15] Geometric Dimensioning and Tolerancing

between the slide assembly and the grip module. The frame receiver material thickness was measured between 1.72 and 1.98 mm, with a minimum of 1.9 mm specified on the Sig Sauer drawing.

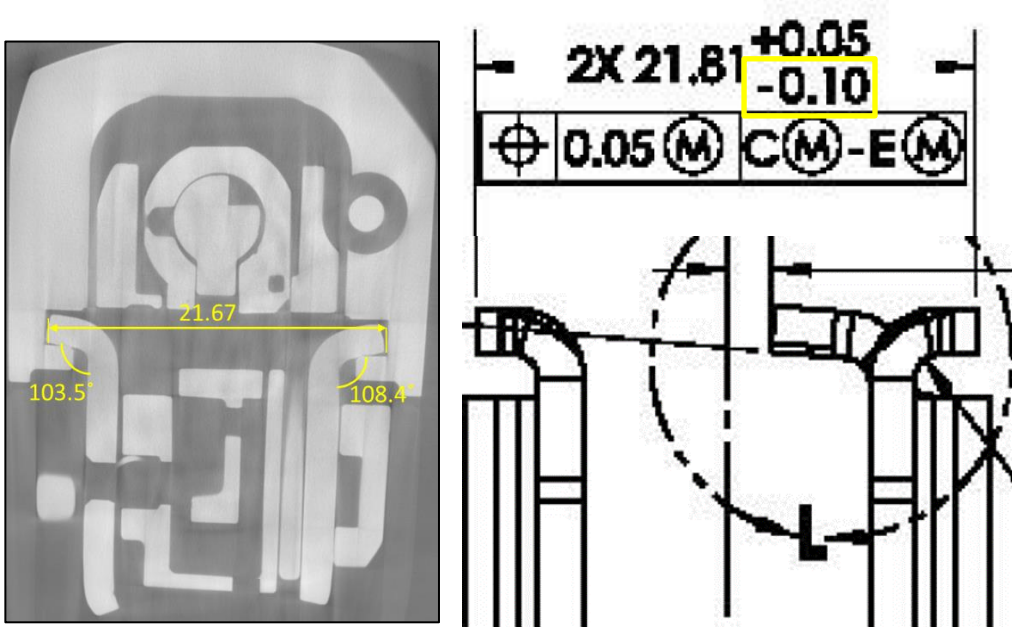

Figure 12 - Receiver stamping measurements from CT scan (left), Sig receiver drawing #1301552

9. In addition to the issue related to the missing safety lever return spring, as well as the misalignment of these safety lock and the striker components, there were also issues noted with the safety lock and the striker stop components. The tab portion of the safety lock had an inconsistent surface, due to being a stamped steel part and unfinished on the area that would engage the striker stop, shown in Figure 13 (left). Correspondingly, the striker stop surface was rounded and unfinished (MIM), as shown in Figure 13 (right). The combination of these two poorly manufactured surfaces would allow the striker to not be restrained by the safety lock, when the striker becomes disconnected from the sear, allowing an un-commanded discharge.

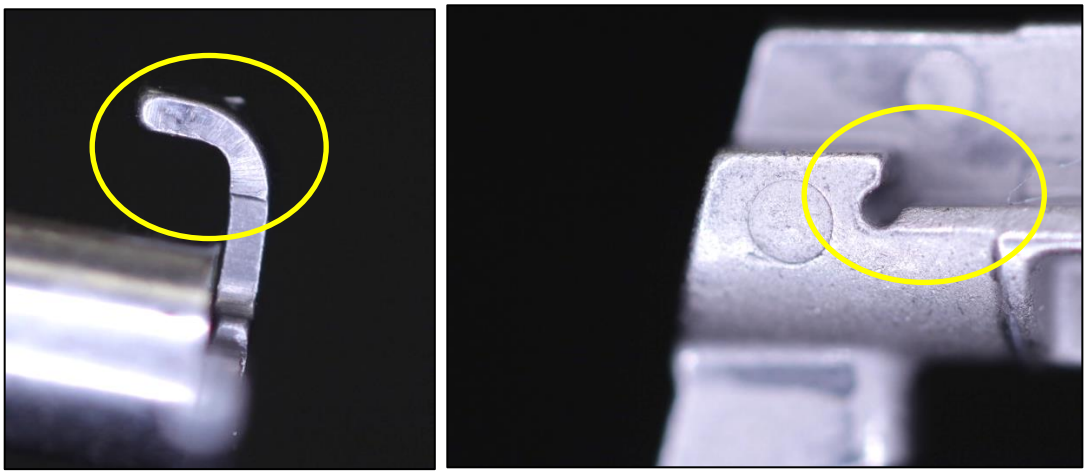

Figure 13 – Exemplar P320 firearm - manufacturing issues with the safety lock tab (left) and the striker stop (right)

Additionally, the CT scan was utilized to quantify certain safety lock and striker stop measurements. Figure 14 shows the CT scan measurements for the safety lock (left) and the corresponding area from the Sig Sauer drawing #1301029[16] (center and right), which show the safety lock tab is not formed properly at 93.4˚, with the drawing indicating 90˚. The profile of the surface shown in Figure 13 (left) of the safety lock tab example, that is intended to come into contact with the striker stop, has a tolerance specified as .008" (0.2 mm). The actual surface quality could not be measured with the CT scan, but it does not appear to visually meet the drawing specification. The thickness of the safety lock material in the area intended to contact the striker stop measured 0.033" (0.84 mm), below the drawing specification minimum of 0.85 mm.

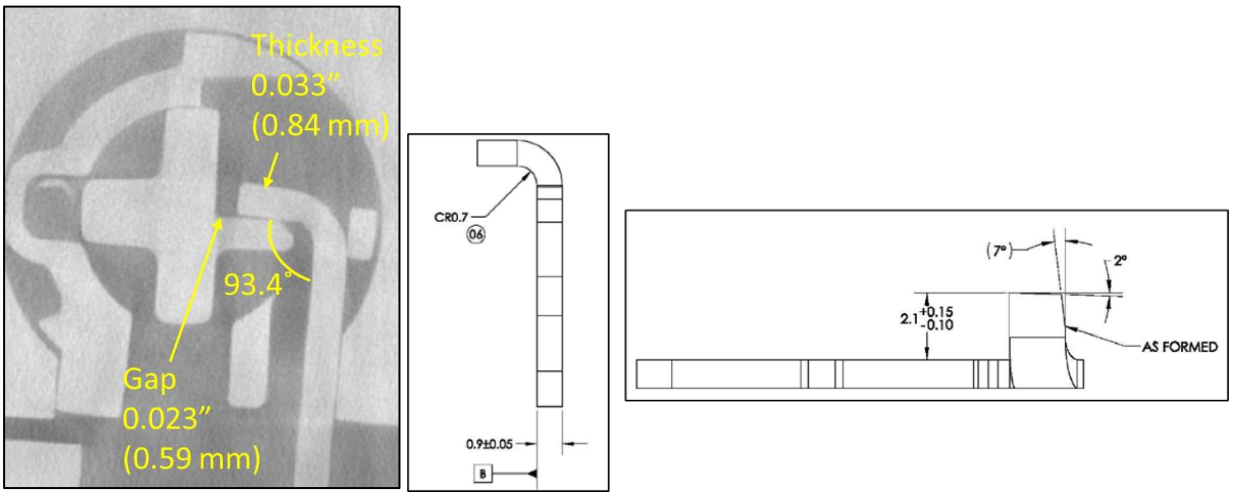

Figure 14 - Safety lock image from CT scan (left), and images from Sig Sauer drawing of safety lock (center and right)

The CT scan was also used to measure and quantify the safety lock and striker stop from a side view. Figure 15 shows the CT scan measurements for the striker stop and safety lock (top and center) and the corresponding area from the Sig Sauer drawings (bottom). These images show the safety lock tab is not formed properly since the 3.7˚ gap is beyond the surface profile designation on the Sig Sauer drawing[17] of 0.004" (0.1 mm). The striker stop has a 0.007" (0.183 mm) radius profile and is 0.035" (0.891 mm) high, compared to 0.004" (0.1 mm) and 0.035" (0.9 mm) respectively, from the Sig Sauer drawing #1302193,[18] shown in Figure 15 (bottom).

[16] Bates SIG-DRAWINGS_00000365.
[17] *ibid*
[18] Bates SIG-DRAWINGS_00000158.

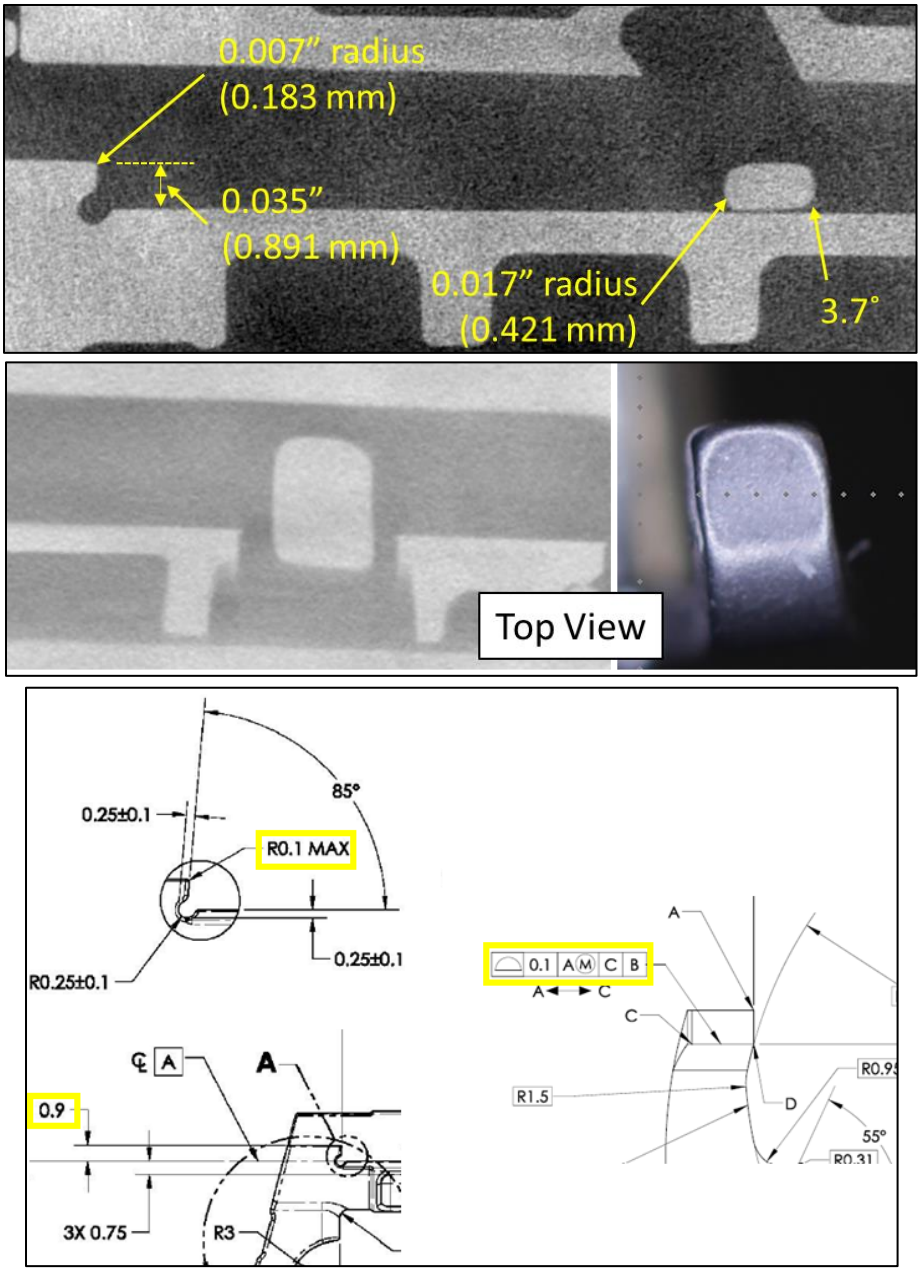

Figure 15 - CT scan of striker stop and safety lock (top), top views of same parts (center), Sig Sauer drawings of the same parts (below)

Since the thickness of the safety lock is specified as 0.035" (0.9 mm), the combination of the quality issues discussed above, misalignment of the striker and safety lock, and possible contact from the safety lever (since the return spring has been eliminated), means that with less than 1 mm of displacement, the safety lock will not be in a position to stop the striker from moving forward if the striker becomes displaced from the sear without the user pulling the trigger. This also assumes that the parts are made to the drawing specification, which they are not, in the subject firearm. The out of specification items described with the safety lock and the striker stop reduces the amount of displacement required to cause the safety lock to fail to stop the striker from contacting the cartridge in the chamber.

Additionally, with the minimal amount of force and travel required on the P320 trigger to move it into a "set" mode (where the initial take up of the travel is eliminated and any further travel begins to rotate the sear), either with inadvertent contact or through vibration or impulse, will allow the safety lever to rotate and disengage the safety lock from the striker channel. This minor amount of trigger travel has been measured at 0.071" (1.8 mm) with under 1.5 lbs. of force on exemplar firearms. Once the safety lock is disabled, the only feature available to keep the striker from being released is the engagement of the striker foot to the sear, measured from the CT scan as 0.032" (0.804 mm). Even if the two components (striker and sear) were made to specification, which they are not, this is an unsafe and dangerous design, given the other defects identified, and the impulse, vibration and other forces experienced during normal and reasonable use that will lead to an un-commanded discharge.

Sig Sauer Testing

Only two documents have been produced by Sig Sauer related to testing performed during the P320 development process. One document is the P320-40 Compact Design Validation, submitted on June 27, 2014, and was completed on July 16, 2014.[19] This is the test request for various abuse tests on only ten sequential samples, mainly for NATO and other durability tests, including drop testing. However, even though the form shows links to the results, there were no results made available. The other document produced was for the P320-C-9 Design Validation, submitted on April 29, 2104.[20] This form does not indicate a completion date. This test request was also for ten sequential samples. The chart shows only one sample being abuse tested for the various drop tests, and the summary indicates that it failed drop testing with an empty magazine well. No additional testing documentation has been produced after the "upgraded" design was implemented.

In October 2021, over two years after the subject incident, and approximately seven years after the introduction of the P320, Sig Sauer finally performed testing. This has been the only testing documentation produced by Sig Sauer in any of the litigation cases, except for the two documents described above. Sig Sauer did not make anyone outside of Sig Sauer aware of the testing so appropriate representatives could be present even though they were aware of pending litigation in multiple states. The testing was performed on ten new firearms, which were different P320 models including pre- and post-upgrade designs.[21] The Sig Sauer test request dated September 2, 2021,[22] states the *"Anticipated Malfunction: Loosening of components, Potential sear disengagement, wear, etc."*. This test request, as well as the test report, both state that video documentation of each test is to be obtained. Those videos were produced in other matters and have been reviewed.

The first tests performed were the vibration tests, which included sinusoidal vibration at various frequencies, and shock (jolt) testing. While the summary report from the testing facility states that no primers were struck, there were several instances of significant movement between the slide assembly and the grip module, with a couple of examples shown in Figures 16 and 17.

[19] SIG-AHERN006312.
[20] Sig-AHERN006308 – 6310.
[21] For reference, over 2,000,000 P320 firearms have been produced since its introduction in 2014.
[22] SIG-DB000809 – DB000812 – AC225 Rough Handling Test - Sinusoidal Vibration and Jolting Test Request.

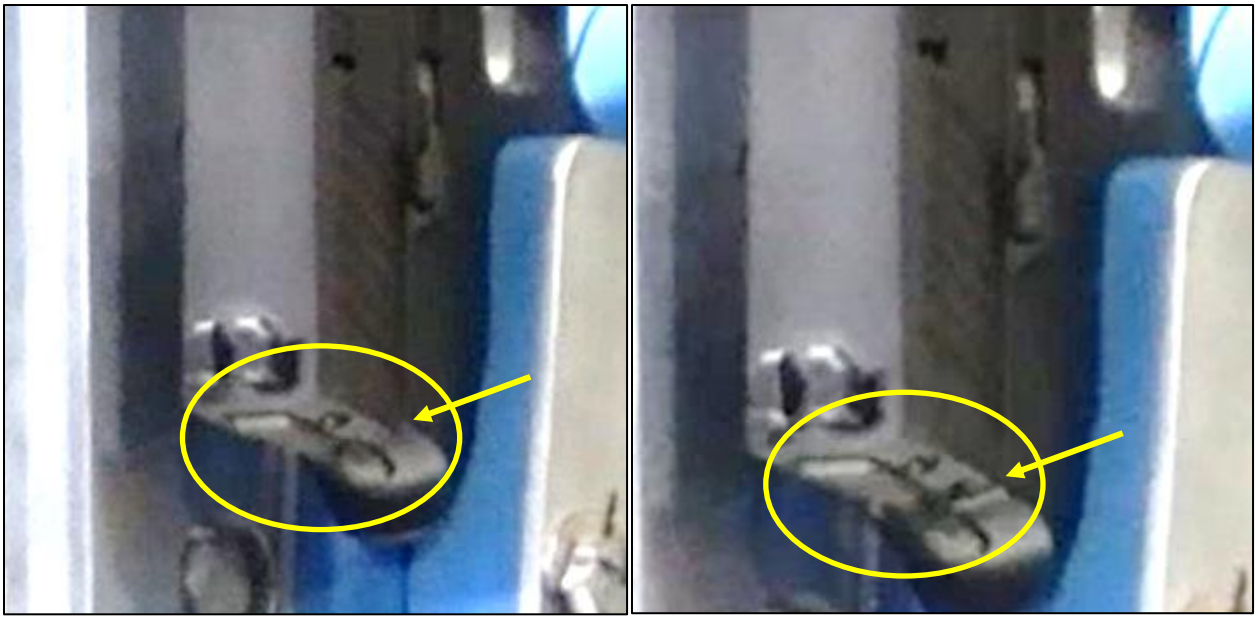

Figure 16 – Sig Sauer Vibration #1 Test #3 Showing slide moving relative to grip module

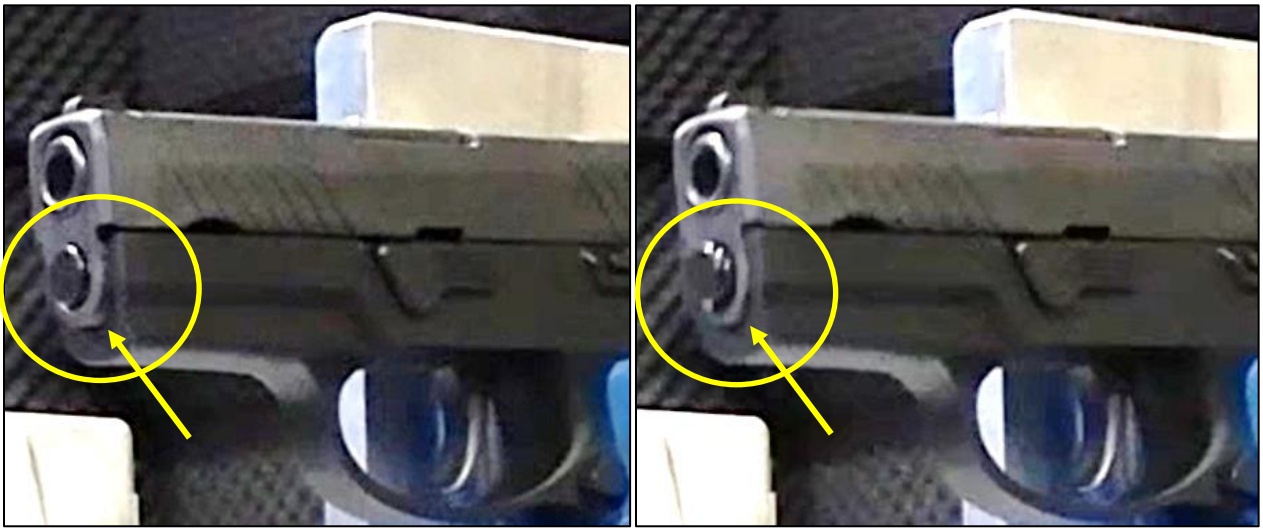

Figure 17 - Sig Sauer Vibration #2 Test #2 Showing slide movement relative to the grip module

Additionally, the vibration test #1, iteration #3 had a trigger stop pin become displaced, as shown in Figure 18.

Figure 18 - Vibration Test #1 Iteration #3 Photo #66 showing trigger stop pin displaced

Transportation Bounce Testing was performed, and additional issues were noticed in the same test report. In the handwritten notes and typed portion of the test report, the lab refers to two out of ten (20%) of the samples tested with the "*sear out of battery*" (out of position) while oriented with the *"vertical butt down"* position.[23] All of the other remarks from the test report state the sear did not move. As with the vibration tests, not all primer casings are visible in the photographs in the report, which does not allow for a complete analysis of the test results to confirm any light strikes.

It is important to note that none of the tests performed in October of 2021 included firearms secured within holsters, or with testing that would simulate real world conditions while being worn or carried. Sig Sauer has also indicated that it didn't know how to develop and incorporate a test that would account for the conditions during normal and expected usage. The real-world conditions would include, but are not limited to:

- Walking, running, crawling,
- Getting into and out of a vehicle,
- Removing and inserting the firearm into a holster,
- Installing and removing a holster from a belt, with a firearm inserted,
- Chasing or apprehending suspects, and,
- The firearm being carried in a holster in a backpack or purse.

Even if each of these normal uses could be measured for the inputs into a chamber loaded firearm, and quantified to determine how many repetitions of each event that would be representative of the life of the firearm, such a test is not practical or reasonable. Not only would the test require a multi-axial machine to be representative of a person carrying a firearm in a holster, but the test would also have to be stopped occasionally to test fire the firearm, perform a field strip and cleaning, and then begin the testing again. Therefore, testing required to attempt to replicate an un-commanded discharge would not be practical, and potentially running for many months.

Sig Sauer has not produced any testing or design assessment materials, besides the two documents described above, during the product development process for the P320 to confirm that the designs, pre and post upgrade, were safe. These documents would include, Failure Modes and Effects Analysis (FMEA), design validation, durability testing, abusive event testing, and product verification tests, prior to going into production. My experience in the automotive industry involved design responsibility for thousands of different parts. While product development and verification plans can attempt to cover real world usage and performance, it is difficult to anticipate and test every scenario and condition. That is why every OEM in the automotive industry (and other government regulated industries) collects and analyzes customer field performance and reliability. Any trends that were not consistent with verification testing results, particularly for safety related issues, were investigated and then validated design changes and/or recalls were vigorously pursued. Since firearms are not regulated by any governmental organization, as opposed to the Federal Motor Vehicle Safety Standards (FMVSS) and the National Highway and Traffic Safety Administration (NHTSA) for vehicles, and the Consumer Product Safety Commission (CPSC) for consumer products, there is no oversight for firearm manufacturers such as Sig Sauer.

[23] Bates SIG-DB000233, DB000236

Certification Testing

Firearm certification testing is required in California and Massachusetts for any firearm manufacturers intending to sell their products in those states. After passing the firing portion of this certification testing, a primer loaded firearm also must be dropped from a height of one meter onto concrete, in various orientations, with no discharge of the firearm allowed. The Sporting Arms and Ammunition Manufacturers' Institute's (SAAMI) drop height requirement is four feet and the firearm is dropped onto a high durometer rubber mat.[24] The Sig Sauer P320 is listed on Massachusetts approved firearms roster, and only recently in California (late summer 2023). The California version of the P320 includes an external manual safety, a chamber loaded indicator, and a magazine disconnect mechanism. These safety mechanisms, as defined by California's Unsafe Handgun Act, are not made available on other non-California versions of the P320 as of the writing of this report. No other test data has been produced by Sig Sauer on the performance of the P320 relative to these state regulations, their own internal testing, and/or firearm industry manufacturer guidelines. While the SAAMI guidelines are voluntary, most manufacturers will test their products to these performance standards to determine the safety and reliability when subject to outside factors, like vibration, impulses, and being dropped. As stated in the SAAMI standard, "Test parameters simulate conditions where abusive mishandling could possibly result in accidental discharge".

Scientific Method

Throughout this investigation, the scientific method was utilized as described in Chapter 4 of the National Fire Protection Association (NFPA) "Guide for Fire & Explosion Investigations."[25] While NFPA 921 is a document devoted to fire investigations and explosions, Chapter 4 is entitled "Basic Methodology" because it is the best forensic definition of expert methodology with which the writer is familiar. Chapter 4 is a generic description of the scientific method applied to forensic analysis.

The scientific method template can involve the following steps:

a. Collection of data,
b. Analyze the data,
c. Development of hypothesis,
d. Testing of the hypothesis,
e. Formation of conclusions if the test proves the hypothesis valid or ruled out if not valid.

The testing can be physical, experimental, or by calculation. In developing any opinion, it is necessary to eliminate other possible explanations for a given set of data or observations. This can take the form of elimination or reduced likelihood as compared to more likely opinions, with reasonable engineering certainty. It is a fallacy to suggest that all testing of hypotheses must be physical, particularly when the testing required is not practical or reasonable. Furthermore, Lt. Ahern is confident that his right index finger was on the slide the entire time that the subject P320 was removed from his holster, allowing the accidental pulling of the trigger to be ruled out, and that it was more likely than not to be an un-commanded discharge event.

[24] ANSI/SAAMI Z299.S-1996 - American National Standard Voluntary Industry Performance Standards Criteria for Evaluation of New Firearms Designs Under Conditions of Abusive Mishandling for the Use of Commercial Manufacturers
[25] NFPA 921-2017 Guide for Fire & Explosion Investigations

Exhibits

If called upon to testify at trial or hearing, my testimony will reference various exhibits, including the subject and exemplar artifacts, photographs, videos, and other documents produced during this investigation. A more detailed listing of exhibits will be produced in accord with orders of the Court.

Summary and Conclusions

The opinions and conclusions detailed in this report are held to a reasonable degree of scientific and engineering certainty. They are based on engineering education, experience, and training, as well as the work conducted to date and the information available at this time. This report will be supplemented as required, based on new information.

Based on the investigation and the work conducted to date, in addition to numerous other similar un-commanded discharge events, the physical evidence described in this report supports Lt. Ahern's description of the circumstances of this incident. The Sig Sauer P320 at issue, being carried by Lt. Ahern, which was being held in the Sul position, at the time of the un-commanded (no trigger pull by the user) discharge incident, was defective and unsafe for use.

There were several quality issues and defects identified in this report that prevented the firearm to reliably perform as intended under normal usage and conditions. Normal and expected movement and vibration while being held caused an un-commanded discharge with a combination of some or all the defective conditions described in more detail in this report, which include:

1) Surface quality (no secondary processing) and misalignment of interfacing sear step and striker foot. With both of these parts being out of specification, the striker became disconnected from the sear without Lt. Ahern pulling the trigger.
2) The face of the safety lock tab and the vertical stop face on the striker body do not meet the drawing specification. Combined with the misalignment of the parts, they were in a condition that both of these areas failed to prohibit the striker from moving forward, without the trigger being pulled, during the subject un-commanded discharge event.
3) Ability of the slide (and therefore the striker assembly) to move vertically and laterally relative to the grip module (and therefore the sear) reduces the interfacing contact surface area even further, which will cause the striker foot to more easily become disengaged from the sear face. This relative movement occurs from normal body movement, vibration, impulses, inertia, and usage of the firearm. Relative movement of the components can occur even while the pistol is securely holstered.
4) The striker foot is unable to engage completely on the surface of the sear step due to the changes in the upgraded design, manufacturing processes and lack of secondary machining, parts not meeting design specification, and fit-up and variation issues between the parts discussed in this report.
5) The removal of the safety lever return spring by Sig Sauer allows the lever to rotate depending on the firearm orientation and possible contact with the safety lock, which can also contribute to the safety lock to be out of position. When this issue is combined with the axial variation described in item 3 above, and the part quality issues, in addition to the minimal trigger travel to the set point rotating the safety lever and disabling the safety lock, it allows the striker to move forward completely when it becomes disengaged from the sear without the user pulling the trigger. The safety lock only has to be out of position (disengaged) or out of tolerance by the thickness of the material (0.9 mm) or equivalent to approximately 9 sheets of printer paper, which begins to occur as the trigger set point is achieved.

6) Without an external safety, such as a manual thumb safety, grip safety, or a tabbed trigger safety (existing technology on other products including on some Sig Sauer products), a minor amount of trigger movement from vibration, shock, impulses, or something coming into contact with the trigger, disables the safety lock. This causes the safety lock to fail, allowing the striker to contact the cartridge in the chamber when it becomes disconnected from the sear, causing an un-commanded discharge.

7) With the manufacturing deviations from the Sig Sauer drawings for several components, it appears that there is little or no ongoing quality inspection of the parts and assembly to ensure adherence to the drawings. The original design and GD&T specifications were deemed important enough to be on the drawings but apparently not critical enough to be verified by Sig Sauer before being assembled into a complete firearm. The firearm will not consistently perform as intended, under normal, expected, and reasonable use, with components that do not meet the design specification, and will be susceptible to un-commanded discharges.

8) All manufacturing processes include some form of process control and quality inspection to ensure that the design is being met. If the manufacturing processes, such as MIM, are not able to consistently produce component parts that meet the drawing specifications related to tolerances, surface finish, etc., then that is an indication that the requirements are too demanding, or the process needs to change, for example, by addition of secondary machining. If the overall performance and safety is not adversely impacted, engineering drawings would need to be modified to reflect any changes to the design or process, and then verified with testing and validation. It appears that nothing along these lines has been produced by Sig Sauer to address the defects identified in this report.

9) The spent casing from the un-commanded discharge event did not eject, further evidence of a firearm malfunction.

There are two features within the design of the P320 that must fail to allow an un-commanded discharge to occur. These are defined as "internal safety features" by Sig Sauer. First, the striker needs to be released by the sear, which based on the defects discussed in this report, is a precarious interface. Due to the minimal amount of contact between the two components (sear and striker), any vibration, impulse, inertia, or jostling of the firearm can cause the striker to be released from the sear. The Sig Sauer patent for the sear also describes how impulses and other inertial forces can cause the striker to become disengaged from the sear. Second, the safety lock, which also exhibits defects and a compromised interface with the striker stop, does not stop the striker from making contact with a cartridge in the chamber. Because of the uncontrolled, or "sloppy" mechanism of the P320 firearm, un-commanded discharges will occur, as evident with numerous incidents across the country, including various law enforcement and experienced firearm personnel.

Report Prepared by:

Timothy M. Hicks, P.E.
Principal Engineer
IL PE License No. 062-064524
Expires November 30, 2025

Reviewed and assisted by:

Roch J. Shipley, Ph.D., P.E., FASM
Principal Engineer
IL P.E. License 062-048091
Expires November 30, 2025

Attachment A

Professional Analysis and Consulting, Inc.

Timothy M. Hicks, P.E.
Principal Engineer
tmhicks@proaaci.com
331-229-3317

2012-Present **Professional Analysis and Consulting, Inc. –** Lisle, Illinois

Performs engineering investigations and failure analysis from a mechanical engineering perspective. Manages and directs large, complex projects involving multiple parties and disciplines. Projects have involved design analysis, product liability, intellectual property, manufacturing systems, accident investigation and reconstruction, fire cause and origin, and product testing. Vehicle experience includes automobiles, motorcycles, heavy trucks, motorhomes, buses, railroad, and commercial vehicles. Equipment experience includes machinery, industrial, lawn, medical, medical accessibility, sporting goods and athletic, agricultural, and construction. Other expertise includes bicycles, forklifts, automated entry doors, elevators, wind energy systems, plumbing, consumer products, firearms, and firearm safety devices. Additionally, he has investigated product packaging failures, aerosol dispenser failures involving impact, projectile and temperature/pressure studies, mechanical design, and systems modeling. He is also certified to perform California DOJ and Commonwealth of Massachusetts Department of Public Safety firearm certification testing.

2010-2012 **Packer Engineering, Inc**. – Naperville, Illinois

Senior Director of Engineering responsible for consultation in the areas of failure analysis, accident investigation and reconstruction, product testing, and design review. Managed projects in a broad range of vehicles including automobiles, SUV's, commercial trucks, RV's, buses and coaches.

2007-2010 **Motor Coach Industries International**, Schaumburg, Illinois

Director of Program Management responsible for establishing a new corporate based group of engineers to develop and introduce new product initiatives for all product and processing areas for luxury coaches. Implemented plans to identify cost reduction projects, developed industry leading proposals for new coach development projects, provided recommendations for improving product and program development processes, and identified and pursued alternate suppliers for major systems and modules for coach production.

2004-2007 **Hendrickson International**, Woodridge, Illinois

2005-2007 Senior Engineering Manager responsible for directing three engineering groups that included front suspension, concept development, and elastomers for the commercial truck, school bus, and RV markets. Developed and launched industry-leading high capacity independent front suspension for motor home and fire truck markets, established process and initiatives for generating constant flow of projects in the concept development group to sustain advanced engineering activities.

2004-2005 Senior Engineering Manager responsible for Current Products and Specialty Vehicles product development and process improvement, utilizing CAD, FEA, and ADAMS simulation. Projects included cost reduction, continuous improvement, and warranty analysis for commercial and vocational trucks, school buses, and military vehicles.

1998-2004 **Oxford Automotive Inc**., Troy, Michigan

2003-2004 Director, Product Engineering that managed product development engineers and CAD/FEA departments for automotive OEMs. Products included metal fabricated, welded, machined and stamped components and systems.

2003 Director, Continuous Improvement that developed corporate strategy for cost reduction initiatives utilizing lean principles and Value Analysis/Engineering techniques

1999-2003 Program Manager who successfully managed suspension module program for a major OEM, taking the project from concept through launch. This included design development, tooling, capital equipment development, quality planning, and manufacturing set-up.

1998-1999 Engineering Manager recruited to develop strategy for suspension module business growth, design development, analysis, prototyping, and validation of suspension module program for a major OEM.

1986-1998 **General Motors Corp.**, Lansing and Warren, Michigan, and Lordstown, Ohio

Progressed through various product engineering roles with increasing responsibilities. Areas of responsibility included product planning, validation and testing, design development, ride and handling, and new product leadership. Products included front and rear suspensions, steering, brakes, engine mounts, drive axles, bearings, ABS/ETS, fuel systems, wheels and tires, jacks and exhaust.

1983-1986 **Progressive Blasting Systems**, Grand Rapids, Michigan

Machine design experience developing CAD skills, and hands on understanding of many manufacturing processes, including welding, machining, assembly, paint, and product quality.

ACADEMIC

M.S. Rensselaer Polytechnic Institute - Engineering Sciences
Management of Technology (1997)

B.S. Michigan Technological University - Mechanical Engineering
Solid Mechanics – Design (1983)

CONTINUING EDUCATION AND CERTIFICATIONS

- Reliability Forecasting, GM (1988)
- Vehicle Dynamics, Kettering (1990)
- Limit Handling, GM (1994)
- Commercial Tire Dynamics, Michelin (2009)
- Traffic Accident Reconstruction Methods, SAE (2010)
- Vehicle Crash Data Retrieval Technician Level 1 & 2, Northwestern University Center for Public Safety (2013)
- Vehicle Crash Data Retrieval Data Analyst, Northwestern University Center for Public Safety (2013)
- Vehicle Dynamics Basics for Off-Highway Trucks, SAE (2014)
- Reconstruction and Analysis of Motorcycle Crashes, SAE (2015)
- Operator Safety Training Program – Forklift Class IV and V, OSHA (2020)
- Crash Investigation and Reconstruction Aerial Photogrammetrist, Northwestern University Center for Public Safety (2017)
- California DOJ Bureau of Firearms, Certificate of Eligibility #47336 (2019)
- Massachusetts Executive Office of Public Safety and Security, Approved Testing Laboratory (2020)
- Operator Safety Training Program – Forklift Class IV and V, OSHA (2020)
- Applying Automotive EDR Data to Traffic Crash Reconstruction, SAE International, (2021)
- SIG SAUER P320 Armorer Certification (2022)

PROFESSIONAL REGISTRATION AND AFFILIATIONS

- Professional Engineer, State of Illinois (License No.: 062-064524)
- Professional Engineer, State of Michigan (License No.: 6201059697)
- Professional Engineer, State of South Carolina (License No.: 30197)
- Professional Engineer, State of Texas (License No.: 131428)
- Professional Engineer, State of Wisconsin (License No.: 47825-6)
- American Society of Mechanical Engineers (ASME)
- Society of Automotive Engineers (SAE)
  - Chairman, Chicago Section (Current)
  - Crash Data Collection and Archiving Standards Committee (Current)
- National Society of Professional Engineers (NSPE)
- National Safety Council (NSC) Transportation Division (2016)

PATENTS

1. Hicks, Timothy M. and Jennings, Daniel E., "Rear Suspension Mounting Feature and Method," 6,401,319 (2000)

2. Hicks, Timothy M. and Jennings, Daniel E., "Trailing Twist Axle and Method of Manufacture," 6,533,300 (2000)

PRESENTATIONS

1. Hicks, Timothy and Shipley, Roch, "Testing – Techniques and Examples – Structural Integrity", American Society for Quality Presentation, Reliability Division, October 2019

2. Hicks, Timothy, Shipley, Roch, Koehler, Michael, "Testing: Techniques and Examples, Making Evidence-Based Decisions", American Society for Quality Presentation, Reliability Division, February 2019

Timothy M. Hicks, P.E.

TESTIMONY LIST

Depositions

2017 Nicholas Papanicholas, Jr. vs. ITP #2, LLC, d/b/a Xtreme Trampoline. Circuit Court of Cook County, Illinois, County Department, Law Division, Case No.: 2014 L 0011476

Luke Keuffer and Stephanie Keuffer vs. O.F. Mossberg & Sons, Inc. and John Does 1-5. Montana Eighteenth Judicial District Court, Gallatin County, Cause No.: DV-11-547B

Rebecca Rysewyk et al., individually and on behalf of all others similarly situated vs. Sears Holdings Corporation, et al. United States District Court, For the Northern District of Illinois, Eastern Division Case No. 1:15-cv-4519

Anthony Nunez vs. Direct Auto Insurance Company. Circuit Court of Cook County, First Municipal District, Case No.: 16 M1 116163

Kathleen Brown vs. The City of Chicago, a municipal corporation. Circuit Court of Cook County, Illinois, County Department, Law Division, Case No.: 15 L 6900

Starla Brandon, Individually and as Heir to the Estate of Bruce Drennan, Deceased vs. Clifton Crumbliss d/b/a C & C Asphalt and Paving, TA Operating, LLC, and TA Operating Texas, LLC. District Court of Montgomery County, TX, 410th Judicial District, Case No.: 15-02-01911

2018 George D. Beucher vs. Penske Trucking Leasing Corporation, a Delaware Corporation, Shur-Lock Self Storage, Inc., an Illinois Corporation, and Roger E. Broders. Circuit Court of the Nineteenth Judicial Circuit, Lake County, Illinois, Case No.: 17 L 386

Vivia Harrison, an individual vs. Ramparts, Inc., d/b/a Luxor Hotel & Casino, a Nevada Domestic Corporation; Desert Medical Equipment, a Nevada Domestic Corporation; Pride Mobility Products Corp., a Nevada Domestic Corporation; Does 1 through XXX, inclusive and Roe Business Entities 1 through XXX, inclusive / Desert Medical Equipment, a Nevada Domestic Corporation vs. Stan Sawamoto, an individual. District Court, Clark County, Nevada, Case No.: A-16-732342-C, Dept. No. 1

Monica Roseboro Caesar v. Schindler Elevator Corporation, CESC Gateway Two, Limited Partnership, and Vornado/Charles E. Smith, L.P. Circuit Court of Arlington County, Virginia, Case No.: CL-17-001099-00

2019 Carolin Scholz, Frank Scholz, and Birgit Scholz vs. Ride the Ducks International, LLC; Ride the Ducks of Seattle, LLC. Superior Court of Washington for the County of King, Case No. 17-2-22720-0 SEA

Graciella Sanchez vs. Alejandro Pantoja. Circuit Court of Cook County, Illinois, County Department, Law Division, Case No.: 2017 L 009007

Timothy M. Hicks, P.E.

TESTIMONY LIST

Shuttlewagon, Inc. vs. Scott Higgins, Emily Coon, Charles Donald Crist, John L. Ying and Innovative Quality Solutions, LLC. In the Circuit Court of Jackson County, Missouri, at Kansas City, Case No.: 1816-CV07674

2020 Jeremiah McDaniels and Stella McDaniels vs. Wolverine World Wide, Inc., Vibram USA, Inc., Safety Shoe Service, Inc., Hytest Safety Footwear, and John Getchell, a Citizen of Indiana. Porter Superior Court, State of Indiana, 64D01-1510-CT-008639

Estate of Roger R. King by Robert Wilmink, Executor vs. McElroy Coal Company, Consol Energy, Thiele GmbH & Co., Murray Energy, et al. Circuit Court of Marshall County, West Virginia, 15-C-169

Brenda Shattuck, as Administrator of the Estate of Walter DeGroff, Deceased vs. Ford Motor Corporation, JMJ Farm Holdings, LLC., Joseph Jingoli, Jr., Joseph Jingoli & Son, Inc., United Rentals, Inc. Supreme Court of New Jersey, Mercer County, Law Division, MER-L-1776-18

2021 W.S.R., an infant by and through his father, William Richardson, and William Richardson and Nicole Richardson, individually vs. FCA US LLC, Yanfeng US Automotive Interior Systems II LLK (a/k/a Yanfeng Automotive Interior Systems), Adient PLC, and Johnson Controls, Inc. / FCA US, LLC vs. JCIM, LLC. United States District Court, Southern District of New York, 7:18-CV 06961

Gordon Wietting vs. Commonwealth Edison Company and Sunbelt Rentals, Inc., Imperial Crane Services, Inc., Genie Industries, Inc., Terex Corporation and Terex South Dakota, Inc. Circuit Court of Cook County, Illinois, County Department, Law Division, Case No.: 18 L 003430

Michael Santos, as Plenary Guardian of the Estate and Person of Viola Santos vs. City of Chicago, and Builders Chicago Corporation. Circuit Court of Cook County, Illinois, County Department, Law Division, Case No.: 18 L 004609

Kelley's Trucking, LLC vs. Atkinson Truck Sales. Circuit Court for Pennsylvania County, Case No.: CL180001623-00

2022 Stephen Mayes v. SIG Sauer, Inc.: United States District Court, Eastern Division of Pennsylvania (Philadelphia), Case No.: 2:20-mc-00105-JMY

Kyle Guay v. SIG Sauer, Inc. United States District Court, District of New Hampshire, Case No.: 1:20-cv-00736-AJ

Jimmy S. C. Jinn vs. SIG Sauer, Inc.: United States District Court, Southern District of New York, Case No.: 1:20-cv-01122-PGG-RWL

Timothy M. Hicks, P.E.

TESTIMONY LIST

Don Esbjornson vs. Black Dog Speed Shop, Inc., an Illinois Company, Gaples Enterprises, Inc., d/b/a Black Dog Racing, Inc., an Illinois Company; Tony Gaples, an Illinois Resident; Ray Sorenson, an Illinois Resident; and Joel Justus, an Illinois Resident; Dick Behrendt, an Illinois Resident. Circuit Court of the Twelfth Judicial District, Will County, Illinois, Case No.: 2015 L 000546

Cheryl Russell, Executrix of the Estate of Joyce A. McKemie, deceased vs. Christian Homes, Inc., d/b/a Washington Christian Village / Christian Homes, Inc., d/b/a Washington Christian Village vs. Invacare Corporation. Circuit Court of the Tenth Judicial District, Tazewell County, Illinois, Case No.: 2018 L 000019

Arconic Inc. vs. Novelis Inc. and Novelis Corp. United States District Court for the Western District of Pennsylvania, Case No.: 17-1434

Jacqueline Bell vs. 87th ST. Laundry Mat, Inc., an Illinois Corporation, d/b/a Mr. Bubbles, and Fusion Skill, Inc. Circuit Court of Cook County, Illinois, County Department, Law Division, Case No.: 20 L 012171

David Wolff, Chapter 7 Trustee of the Estate of Eugeno Sinclair vs. Nabil N. Kassem, Esq.; Kassem & Associates, P.C., Superior Court of New Jersey, Law Division, Case No.: BER-L-8831-18

Brittany B. Hilton vs. SIG Sauer, Inc. United States District, Eastern District of Texas, Beaumont Division, Case No.: 1:21-cv-00441-MJT

State of Iowa vs. Marshawn Rome Jackson, Linn County, In the Iowa Court in and for Linn County, Case No.: 06571 FECR143871

2023 Keith and Bianca Cemini Slatowski vs. SIG Sauer, Inc. United States District Court for the Eastern District of Pennsylvania, Case No.: 1-21-cv-00729

Ann Fagan-Podber and Mark Podber v. Bird Rides, Inc., JAMS Arbitration, No.: 1440007371

Elvis Ramon Green Berrios vs. SIG Sauer, Inc. United District Court for the District of Puerto Rico, Case No.: 3:22-cv-01002

Cheryl A. Strong, as Parent and Next Best Friend of Jacqui A. Strong, a Minor, vs. Kyriakos Tsiolis; Ismael Mercado vs. Kyriakos Tsiolis, Quality Refrigerated Transport, Inc., an Illinois Corporation, Roman Mykhailov, Agent and Employee of Quality Refrigerated Transport, Inc., and Ernest Marquez, Defendants; Ernest Marquez, Sr.; Ernest Castromarquez, Jr.; Abigail Castromarquez, a Minor; and Gabriela Castromarquez, a Minor, vs. Kyriakos Tsiolis. Circuit Court of Cook County, Illinois, County Department, Law Division; Case Nos. 21 L 007536, 21 L 011207, and 21 L 009294

Timothy M. Hicks, P.E.

TESTIMONY LIST

Trials

2017 Kathleen Brown vs. The City of Chicago, a municipal corporation. Circuit Court of Cook County, Illinois, County Department, Law Division, Case No.: 15 L 6900, Judge Gregory J. Wojkowski

2018 Kathleen Brown vs. The City of Chicago, a municipal corporation. Circuit Court of Cook County, Illinois, County Department, Law Division, Case No.: 15 L 6900, Judge Gregory J. Wojkowski (retrial)

Anthony Nunez vs. Direct Auto Insurance Company. Circuit Court of Cook County, Illinois, County Department, Chancery Division, Case No.: 16 M1 116163

Randy G. Pate, Sr. vs. Pace Suburban Bus Division of the Regional Transportation Authority, a municipal corporation, Jocelyn Etienne. Circuit Court of Cook County, Illinois, County Department, Law Division, Case No.: 17 L 236

Viva Harrison, and individual vs. Ramparts, Inc., d/b/a Luxor Hotel & Casino, a Nevada Domestic Corporation; Desert Mechanical Equipment, a Nevada Domestic Corporation / Desert Medical Equipment, a Nevada Domestic Corporation vs. Stan Sawamoto, an individual. District Court, Clark County, Nevada, Case No.: A-16-732342-C

2019 Graciela Sanchez vs. Alejandro Pantoja. Circuit Court of Cook County, Illinois, County Department, Law Division, Case No.: 17 L 0009007

2020 Shuttlewagon, Inc., a Delaware Corporation vs. Scott Higgins, Emily Coon, Charles Donald Crist, John L. Ying, Innovative Quality Solutions, LLC. Circuit Court of Jackson County, Missouri, Case No. 1816-CV07674, Division 18

2021 The People of the State of Illinois vs. Jared M. Queen. Twentieth Judicial Circuit, County of Washington, Case No.: 2019-CF-40

2022 The State of Nevada vs. Elizabeth Vallaster. Justice Court of New River Township, County of Churchill, State of Nevada, Case No.: 20 CR 00519

Commonwealth of Pennsylvania vs. Brandon W. Bostian, Philadelphia Municipal Court and Common Pleas, County of Philadelphia, Case No.: MC-51-CR-0014115-2017

Kyle Guay v. SIG Sauer, Inc. United States District Court, District of New Hampshire, Case No.: 1:20-cv-00736-AJ

2023 Ann Fagan-Podber and Mark Podber v. Bird Rides, Inc., JAMS Arbitration, No.: 1440007371

Desian Llalla v. P.O.M. Truck Repairs Corp., an Illinois Corporation, Circuit Court of the Eighteenth Judicial Circuit, DuPage County, Illinois, Case No.: 2020 L 000193

Professional Analysis and Consulting, Inc.

2023 Fee Schedule

General:

- After professional services have been agreed upon, services will be billed periodically (typically monthly) as work progresses
- Payment is due within 30 days of date of invoice
- Additional equipment usage fees may apply
- Deposition and court testimony are billed in half-day time blocks
- Travel time is billed portal to portal (unless other arrangements have been made)
- Fees subject to change on a semi-annual basis

Professional Services (in U. S. Currency):

• Administrative Support Staff	$50 – $95 per hour
• Hicks, Timothy M., M.S., P.E.	$310 per hour
• Koehler, Michael G., Ph.D., ACSF	$325 per hour
• Laun, Johannes C., P.E., IAAI-CFI, MIFireE	$310 per hour
• Leckie, Glen K., P.E.	$275 per hour
• O'Neill, John A. FAA A&P/IA	$250 per hour
• Shipley, Roch J., Ph.D., FASM, P.E.	$450 per hour

Additional staff may be involved as required

Charges for Expenses:

• Automobile Travel	65.5¢ per mile (IRS rate)
• Other Travel and Lodging	Cost – no mark up
• Specialty Supplies and Materials	Cost – no mark up
• Outside Lab Services	Cost – no mark up

Equipment, Supplies, and Reference Materials

- Charges and rental fees may apply for specific laboratory testing, field inspections, supplies, equipment, and reference materials.

Case-Related Artifact Handling and Storage

- Licensed Private Detective Agency holding Private Detective License in accordance with 225 ILCS 447 for retaining evidence.
- In compliance with ASTM Standard for evidence handling.
- Initial Receipt of Subject Artifact, Chain of Custody documentation and photography of evidence.
- Storage and Evidence Records Management Fees of subject and exemplar artifacts/evidence will be billed quarterly.

Hosting of Joint Party Inspections

- Arrangements made on a case specific basis **$500 per day**
  (Professional assistance, food, and beverages are supplied at additional cost.)

Attachment B

Professional Analysis and Consulting, Inc.

Ahern v. Sig Sauer, Inc., et al

Project No.: 2018

	Classification	Description
1.	Background Compiled	American National Standard, Voluntary Industry Performance Standards, Criteria for Evaluation of New Firearms Designs Under Conditions of Abusive Mishandling for the Use of Commercial Manufacturers, ANSI/SAAMI Z299.5-1996
2.	Background Compiled	Bose, Animesh, *Introduction to Metal Powder Injection Molding*, ASM Handbook, Volume 7, Powder Metallurgy (2015)
3.	Background Compiled	National Institute of Justice, Law Enforcement and Correctios Standards and Testing Program, Autoloading Pistols for Police Officers, NJJ Standards-0112.03 (Rev. A, July 1999)
4.	Background Compiled	U.S. Army Developmental Test Command, Test Operations Procedure (TOP) 3-2-045, 09/17/2007, Small Arms – Hand and Shoulder Weapons Machineguns
5.	Background Compiled	U.S. Army Test and Evaluation Command, International Test Operations Procedure (ITOP) 4-2-602, 10/19/1993, Rough Handling Tests
6.	Background Compiled	U.S. Patent • Handgun Sear with Multiple Engagement Surfaces • Patent No.: US 10,684,087 B2 • Patent Date: Jun. 16, 2020 • Applicant: Sig Saur, Inc., Newington, NH
7.	Background from Client	SIG-AHERN006308 – 006310
8.	Background from Client	SIG-AHERN006312
9.	Background from Client	SIG-DB_000001-000812
10.	Background from Client	SIG-DRAWINGS_000001-000371
11.	Background from Client	SIG-QC 000001 – 000092
12.	Background from Client	U.S. Patent Application Publication • Handgun Sear with Multiple Engagement Surfaces • Pub. No.: US 2019/0107353 A1 • Pub. Date: Apr. 11, 2019 • Sig Sauer, Inc., Newington, NH
13.	Deposition	David Puopolo taken 07/14/2023
14.	Deposition	Greg Gutoski taken 07/13/23 with exhibits
15.	Deposition	Lester Sullivan taken 07/14/2023
16.	Deposition	Michael Taylor taken 07/13/2023 with exhibits
17.	Deposition	Sean Toner taken 11/15/2023
18.	Deposition	Thomas Ahern (Vol. 1) taken 06/08/2023 with exhibits
19.	Deposition	Thomas Ahern (Vol. 2) taken 06/27/2023 with exhibits
20.	Deposition	William LaMonica taken 06/29/2023 with exhibits
21.	Inspection	CT Scans, 10/13/2022
22.	Inspection	P. Villani inspection photographs 10/13/2022

	Classification	Description
23.	Inspection	T. Hicks inspection photographs 10/13/2022 including CT scans
24.	Legal	Complaint